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**BASE FORCE RETENTION RATE (BFR): AN
IMPROVED MEASURE OF NAVY OFFICER RETENTION**

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**BASE FORCE RETENTION RATE (BFR):
AN IMPROVED MEASURE OF NAVY OFFICER RETENTION**

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This report describes the base force retention rate (BFR), an alternative to the RR. The BFR does not rely on MSR-based computation but, rather, is the proportion of officers with between 5 and 10 years of service who resign their commission annually. The report includes illustrations of the BFR's usefulness in identifying changes or trends in an officer community's retention behavior--trends that the conventional RR might not reveal or might only uncover much later than would the BFR.

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FOREWORD

This research and development was conducted in response to Navy decision coordinating paper Z1187-PN (Computer-based Manpower Planning and Programming), subproject PN.02 (Officer Personnel Management Models) and was sponsored by the Deputy Chief of Naval Operations (Manpower, Personnel, and Training) (OP-01). The objective of this subproject is to develop a set of user-oriented, computer-based models and data bases to assist in the development of a Navy officer force that meets officer manpower requirements.

This report describes the base force retention rate (BFR), which was developed as an alternative to the current OP-01 officer retention rate (RR). Since the BFR has proved to be a more accurate and timely measure of the maintainability of the Navy's officer force than the RR, it should be considered as a substitute for the RR as the official retention measure.

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SUMMARY

Problem

The retention rate (RR) is a measure currently used by offices of the Deputy Chief of Naval Operations (Manpower, Personnel, and Training) (OP-01) to assess the Navy's ability to build and maintain a "career force" of officers. This measure compares the number of officers who are within 1 year of completing their minimum service requirement (MSR-1) to the number in that same group at a point 2 years beyond MSR (MSR+2). It is based on the assumption that, once an officer passes the MSR "window" (MSR-1 to MSR+2), he or she can be considered a permanent member of the career force. However, since the body of officers labelled "careerists" continues to experience voluntary losses (i.e., resignations) after the MSR+2 point, the RR's value as a measure of career intentions becomes questionable. Since FY74, 20 percent or more of officer resignations have occurred beyond the MSR window. Since the RR fails to capture resignation behavior beyond MSR+2, it tends to overstate the Navy's ability to maintain the officer career force.

Objective

This report describes the base force retention rate (BFR), an alternative to the RR. The BFR does not rely on MSR-based computations but, rather, is simply the proportion of the career force base (CFB) (officers with between 5 and 10 years of commissioned service) who resign their commissions annually.

Findings

1. The BFR is most useful for identifying changes or trends in the overall retention behavior of an officer community--trends that the conventional RR might not reveal at all or might only uncover much later than would the BFR. For example, using the BFR, retention analysts would have been able to identify the beginning of the late-1970's pilot shortage from 1 to 2 years earlier than was possible with the RR.

2. While the BFR is designed to measure retention behavior of the entire CFB, it cannot indicate the specific place within the CFB where problems may arise. Similarly, it is unable to signal shifts in the distribution of resignations within the CFB over time.

3. The mean length of service (LOS) of the CFB resignations was computed to complement the BFR. Together, they form a useful measure of the extent and timing of officer losses.

Recommendation

Because the BFR provides a more accurate and timely measure of the maintainability of the Navy's officer force than does the RR, it is recommended that it be substituted for the RR as OP-01's official measure of officer retention.

CONTENTS

	Page
INTRODUCTION	1
THE BASE FORCE RETENTION RATE (BFR)	3
Development and Application	3
Enhancing the BFR	5
Using the BFR and NSR	8
CONCLUSIONS AND RECOMMENDATION	11
DISTRIBUTION LIST	13

LIST OF TABLES

1. Resignations in the Unrestricted Line (URL) Officer Community by Fiscal Year	2
2. Distribution of Resignations Within the Career Force Base (CFB) for the Nuclear Submarine Warfare Community, FY74 and FY76	6
3. Cumulative Distribution of Resignations in the Career Force Base (YCS 5-10), FY74-76 of the Surface Warfare Community	8
4. Mean Years of Commissioned Service (YCS) of Career Force Base Resignations, FY74-81, by Community	10

LIST OF FIGURES

1. Distribution of FY78 URL resignations by years of service	3
2. Base force retention rate (BFR) and retention rate (RR) for the pilot community, FY74-81	4
3. Base force retention rate (BFR) and retention rate (RR) for the surface warfare community, FY74-81	5
4. "Survival" rates for the pilot career force (CFB), FY77-79	7
5. Distribution of resignations in the nuclear submarine career force base, FY76 and FY79	9
6. Distribution of resignations in the restricted line/staff corps career force base, FY76 and FY78	10

INTRODUCTION

The need to measure naval officer retention is based on at least three important factors:

1. The cost of educating and training officers (before and after commissioning) is substantial. Thus, to determine the return on that training investment, it is necessary to measure retention. The higher the retention, the greater the return.
2. The development of a personnel budget or plan for personnel assets under fiscal constraints (programming) requires estimates of future personnel losses or, its complement, retention. An effective measure of current and historical retention is critical to estimating retention for budgeting or programming purposes.
3. The feasibility of attaining future manpower goals (e.g., the number or proportion of career officers) depends on assumptions about future levels of retention. Clearly, a more accurate measure of retention enables planners to develop more realistic assessments of the feasibility of attaining particular force objectives.

A retention measure must have the following characteristics:

1. Accuracy. The measure should capture the Navy's degree of success in sustaining a career force. The extent to which the measure over- or understates the size of this pool of career officers is an indication of its accuracy (or lack thereof).
2. Timeliness. Because manpower managers require sufficient lead time to identify personnel shortages or overages and take appropriate action, the retention measure should uncover deficiencies early enough to permit managers to respond. Moreover, the derivation of the measure should require limited data processing so as to minimize the lag between the time the force is observed and the information is reported.
3. Simplicity. Above all, the measure should be simple. Retention statistics are highly visible items used to convey rapidly the health of the personnel system to internal managers and to external organizations such as the Office of the Secretary of Defense (OSD) and Congress. Complex retention reports generally receive considerably less attention.

The retention rate (RR), which is currently used by offices of the Deputy Chief of Naval Operations (Manpower, Personnel, and Training) to assess the Navy's ability to build and maintain a "career force" of officers, compares the number of officers who are within 1 year of completing their minimum service requirement (MSR-1) to the number in that same group at a point 2 years beyond MSR (MSR+2).¹ It is based on the assumption that, once an officer passes the MSR "window" (MSR-1 to MSR+2), he or she can be considered as a permanent member of the career force. Thus, the RR is intended to show the portion of a personnel cohort that is expected to become members of the career force in any particular year.

¹Minimum service requirement (MSR) is the obligated service an officer incurs as a result of initial commissioning and specialized warfare training. The MSR differs by commissioning source (e.g., a Naval Academy graduate receives a longer MSR than an Officer Candidate School graduate) and by warfare training (e.g., the service obligation for flight training exceeds that for Surface Warfare Officers' School).

Before the effectiveness of a particular retention measure can be evaluated, the concept of a career force must be defined in more specific terms. In the case of the RR, the career force is simply the collection of those individuals who pass the MSR window. It is assumed that the proportion of a cohort passing this window has opted for a naval career (vice other employment alternatives). However, if the body of officers labelled "careerist" continues to experience voluntary losses (i.e., resignations) after the MSR+2 point, the RR's value as a measure of career intentions becomes questionable.

One way to evaluate the RR's effectiveness is to assess its accuracy in terms of the proportion of annual losses embedded in the rate. Using the unrestricted line (URL) community as an example, Table 1 shows the proportion of resignation losses captured by the MSR window (i.e., the RR) each year. The difference between total resignations and window resignations represents the level of retention not accounted for in the RR. In the URL community during the period FY74-81, 20 percent or more of the resignations occurred beyond the MSR window.

Table 1
Resignations in the Unrestricted Line (URL) Officer
Community by Fiscal Year

Fiscal Year	Total Resignations	Resignations from MSR-1 to MSR+2	% of Total	Resignations from MSR+3 to MSR+n	% of Total
74	1101	885	80.4	216	19.6
75	907	705	77.7	202	22.3
76	884	650	73.5	234	26.5
77	1193	673	56.4	520	43.6
78	1268	671	52.9	597	47.1
79	1356	944	69.6	412	30.4
80	1295	972	75.1	323	24.9
81	1015	789	77.7	226	22.3

The deficiency of a retention measure based on MSR alone is clear. Among other reasons, the MSR may not reflect an officer's actual or full service obligation. Extensions can be accrued by postgraduate education, additional training, and/or augmentation. As a result, it is not appropriate to assume that most officers who are going to resign will do so by MSR+2. Many officers who might have left the Navy during the MSR to MSR+2 period, but were prevented from doing so by additional obligation(s) beyond MSR, may resign well past MSR+2. By failing to capture resignation behavior beyond MSR+2, the RR tends to overstate the Navy's ability to maintain the officer career force.

Analysis of resignation data has shown that a significant number of resignations are occurring in the 7-10 years of commissioned service (YCS) period--a period of the career considered beyond MSR+2 for most officers. In Figure 1, the MSR window is overlaid on the FY78 distribution of resignations within the URL by YCS. Note that losses persist beyond the window and do not become insignificant until the 11-year point. In this case, the career force starts at about 11 YCS--as opposed to the 7th year, indicated by MSR+2.

In general, a more accurate definition of career force would be based on the year of service at which voluntary losses become insignificant. For a particular community, in a particular historical year, the starting point of the career force might vary. However, the 11-year point appears to satisfy the criterion of a career force, at least for the URL.

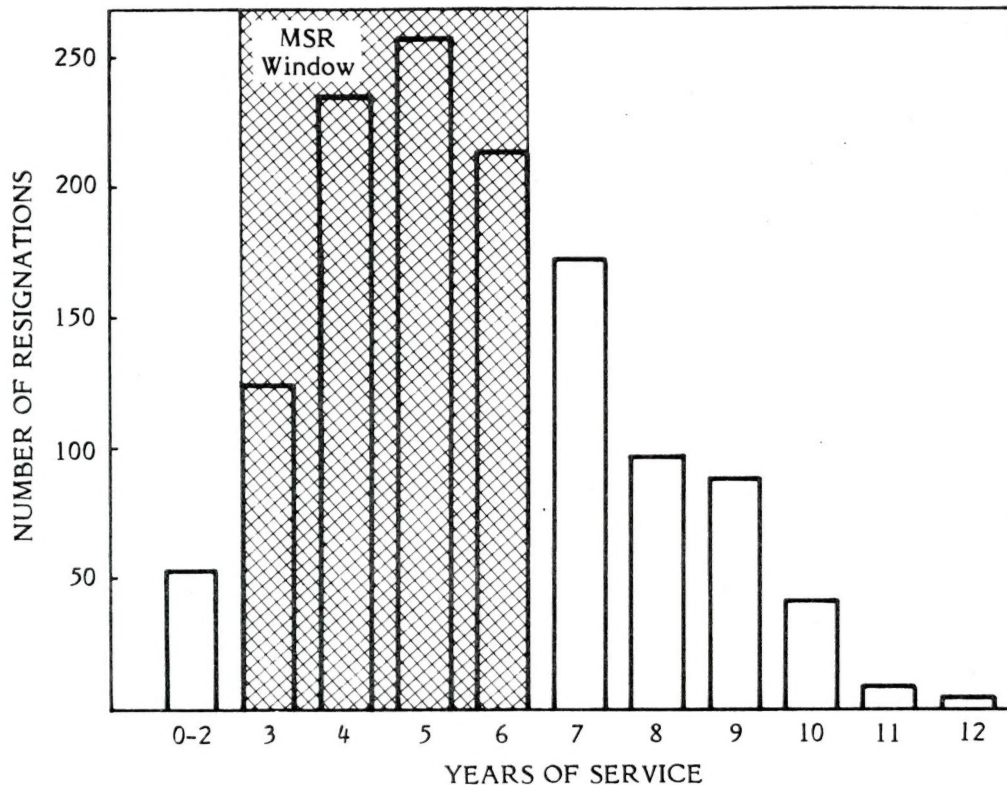


Figure 1. Distribution of FY78 URL resignations by years of service.

THE BASE FORCE RETENTION RATE (BFR)

Development and Application

An officer should probably not be considered a permanent member of the career force until the completion of about 10 YCS. Thus, the part of the career force of most concern is the period starting when officers finish their obligation and ending at the 10 YCS point. This segment of the force, which will be called the career force base (CFB), is composed of "due course" officers (those who have not failed selection for promotion) of the regular Navy with 5 to 10 YCS at the beginning of the fiscal year. Because the CFB is beyond initial obligation, it is particularly sensitive to internal conditions (e.g., perceived promotion opportunity) and external conditions (e.g., civilian employment opportunities).

To improve tracking of this force over time, a base force retention rate (BFR) can be computed for each major community² each year. The BFR is simply the annual proportion of the CFB who retain their commissions.³ Because the BFR does not rely on MSR-based computations, it has the potential to improve the "reading" of a community's capacity to build and maintain a career force.

The BFR is most useful for identifying changes or trends in the overall retention behavior of a community's CFB--trends that the conventional RR might not reveal at all or might only uncover much later than would the BFR. To illustrate this, Figure 2 displays the FY74-81 RR and BFR for the pilot community. Note that the decrease in pilot retention in the late 1970s was reflected by the BFR as early as FY77, when the RR was reaching its peak. The RR was growing during the period from FY74 to FY77, while the BFR reached its peak in FY75 and declined continuously through FY79. Through this period, the BFR reflected the growing problems with pilot retention (and the upturn after FY79) more accurately and responsively than did the RR.

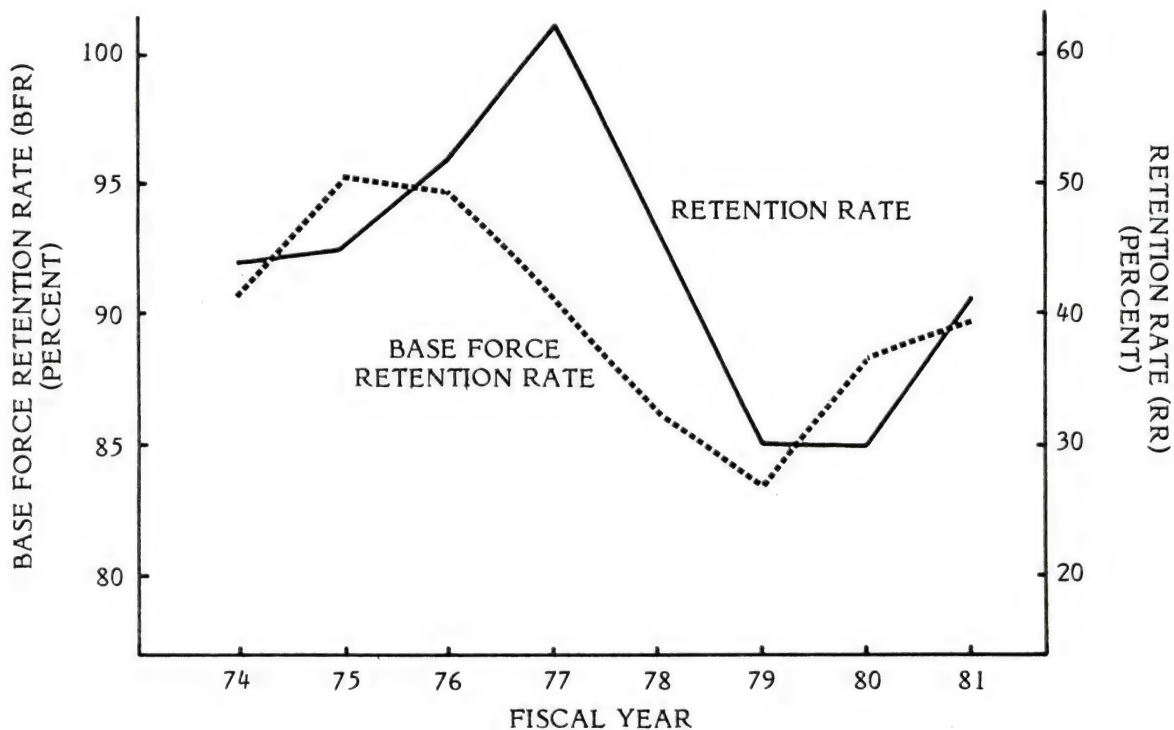


Figure 2. Base force retention rate (BFR) and retention rate (RR) for the pilot community, FY74-81.

²Related occupational specialty areas are grouped into "communities" (e.g., surface warfare, aviation, supply corps) for planning purposes.

³The complement of the BFR, 1-BFR, is that portion of the CFB who resign their commissions annually.

Figure 3 displays the FY74-81 rates for the surface warfare community. While the RR showed sensitivity to the relatively narrow MSR window, the BFR was fairly stable during this period.

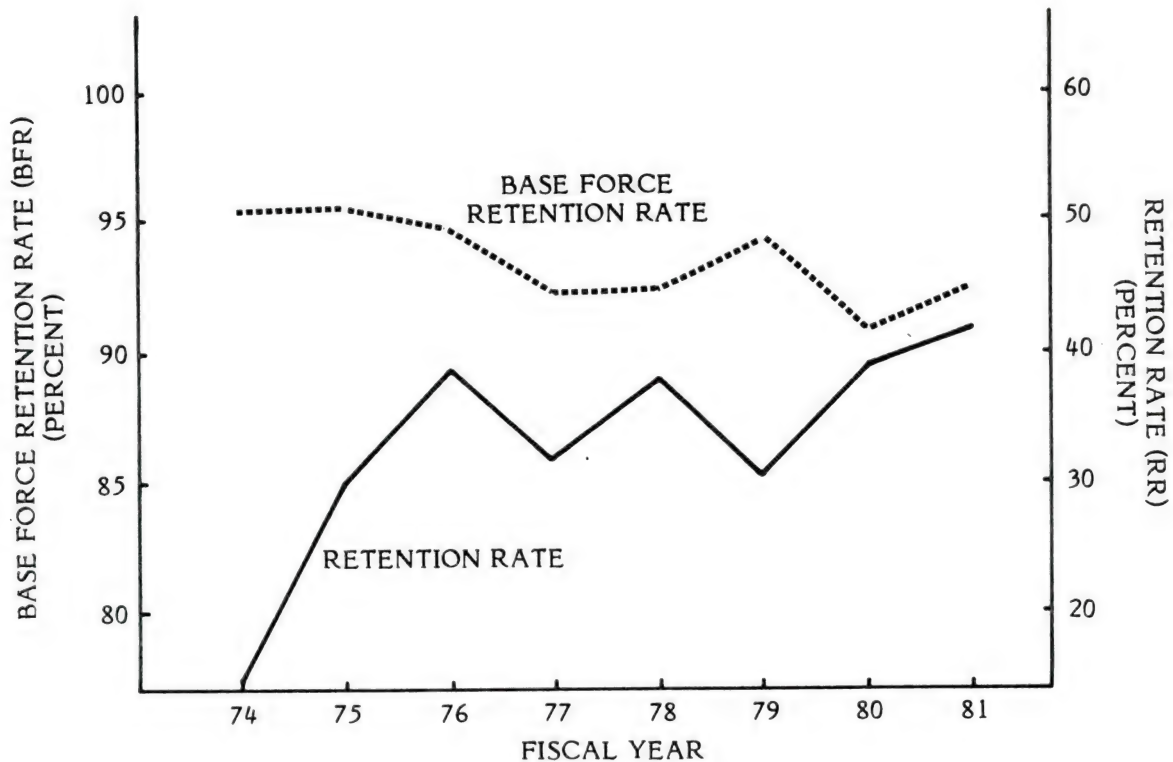


Figure 3. Base force retention rate (BFR) and retention rate (RR) for the surface warfare community, FY74-81.

Enhancing the BFR

While the BFR is designed to measure retention behavior of the entire CFB, it cannot indicate the specific place within the CFB where problems may arise. Similarly, it is unable to signal shifts in the distribution of resignations within the CFB over time. For example, equal BFRs may be observed in 2 successive years in a community, but the ability to maintain the career force may be quite different between the 2 years. This could result from a significant shift within the 6-year CFB range (YCS 5-10) where most resignations are tendered; that is, officers may be leaving later or earlier in one year than in another year. Table 2 illustrates such a shift for the nuclear submarine warfare community from FY75 to FY76.

Table 2
Distribution of Resignations Within the Career Force Base (CFB)
for the Nuclear Submarine Warfare Community
FY75 and FY76

Years of Service	FY75		FY76	
	Resignation Losses	% of Total Losses	Resignation Losses	% of Total Losses
5	33	38	30	48
6	13	15	11	18
7	14	16	7	11
8	17	20	9	15
9	2	2	5	8
10	8	9	0	0
Total	87	100	62	100

To improve the precision of the BFR, a measure of the distribution of resignations within the CFB is necessary. This was accomplished by first computing continuation rates, CR_{ij} , for each YCS cell i in fiscal year j . Continuation rates denote the portion of officers that begin a year in a particular YCS cell and community and are still serving there 1 year later. Stated mathematically,

$$CR_{ij} = N_{i+1,j+1}/N_{ij},$$

where N is the number of officers onboard.

Implied "survival rates" can be readily computed from continuation rates. Survival rates estimate the probability that an officer who is onboard at YCS 5 will remain onboard to some specific YCS point (6,7,...) up to YCS 10. The probability of survival to YCS i ($i = 5$ to 10) is simply the product of the continuation rates from YCS 5 to YCS i :

$$SR_{ij} = \prod_{i=5}^{10} CR_{ij}$$

where

SR_{ij} = "survival rate" for YCS i , in FY j ,

CR_{ij} = continuation rate for YCS i , in FY j , and

\prod = "product of... ."

Survival rates computed during a particular year can be used to infer survival behavior of a "cohort" traveling from YCS 5 to YCS 10. By assuming that the continuation behavior of the officers in YCS cells 5-10 in FY j (cross-sectional data) represent cohort behavior (longitudinal data), a survival profile or curve can be constructed from a single year of data.⁴ Because the composition of the CFB (cell size, resignation rate, etc.) changes over time, these quasi-cohort survival rates change as well. This is demonstrated in Figure 4 by plotting survival rates for the pilot community to produce survival curves.

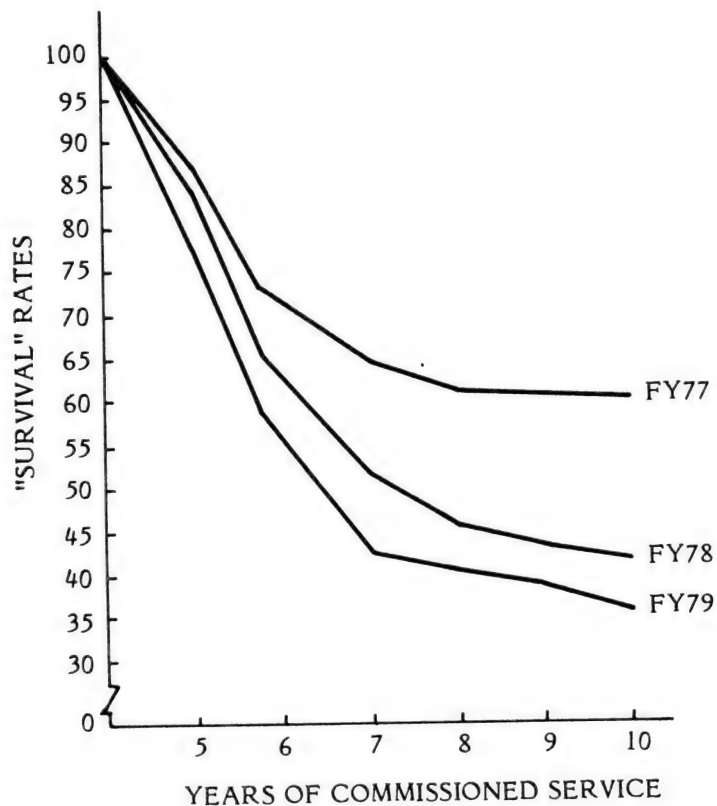


Figure 4. "Survival" rates for the pilot career force base (CFB), FY77-79.

Individual survival curves are useful for noting overall changes in retention behavior. For example, using Figure 4, in FY79, a smaller portion of the pilot cohort was expected to survive at every YCS cell than in FY77 and FY78. Nevertheless, these curves cannot,

⁴It should be noted that true survival rates are based on the movement of a particular cohort over time through YCS cells, while quasi-survival rates are constructed from cross-sectional observations of many cohorts. Because of data limitations, it is often difficult to produce true survival rates.

by themselves, denote changes in the distribution of resignations across the CFB from year to year. This requires an additional step, one that makes the curves comparable. Comparable or "normalized" survival rates (NSR)--survival rates of the losses--can be produced by:

$$NSR_{ij} = (1/(1-SR_{10,j})) \times (SR_{ij}-SR_{10,j}).$$

Multiplying the original survival rates by $1/(1-SR_{10,j})$ has the same effect of making NSR_{ij} range between 1.0 (when $SR_{ij} = 1.0$) and 0.0 (when $YCS\ i = 10$). Thus, for those officers who resigned from the CFB each year, the NSR describes how their departures were distributed over the YCS cells. Put another way, the NSR indicates the probability that an officer who will resign during the CFB years will wait until YCS 5, 6,...10.

A "profile of losses" based on the NSR was computed for various communities in the period FY74-81. This concept is illustrated in Table 3, using the surface warfare community as an example. Table 3 indicates that, for this community, nearly 55 percent of FY74 resignations in the YCS 5-10 group had occurred by YCS 5, and 45 percent came after YCS 5. In contrast, only 36 percent of FY76 resignations had occurred by YCS 5.

Table 3
Cumulative Distribution of Resignations in the Career
Force Base (YCS 5-10), FY74-76, of the
Surface Warfare Community

YCS	FY74	FY75	FY76
5	0.5465	0.4445	0.3625
6	0.7315	0.7980	0.6911
7	0.8467	0.9095	0.8756
8	0.9081	0.9660	0.9442
9	0.9305	0.9765	0.9773
10	1.0000	1.0000	1.0000

Note. The cumulative distribution of resignations is equal to 1.0 minus the new survival rate (NSR) of the resignations.

Using the BFR and NSR

A set of examples can be used to show how the NSR can be combined with the BFR to produce a more comprehensive picture of officer retention.

1. Differentiating between equal BFRs. The BFRs for the nuclear submarine warfare community in FY76 and FY79 were .8916 and .8966 respectively. This might suggest that the maintainability of the career force in that community had probably not

changed. However, when the pattern of resignation behavior across the CFB for the 2 fiscal years is compared (see Figure 5), there is a difference. In FY76, roughly 88 percent of all resignations had occurred by YCS 7 (only 12 percent of the losses survived beyond YCS 7), compared to 80 percent for FY79. Stated differently, in FY79, 88 percent of the losses had occurred by YCS 8.5 (vice 7.0 for FY76). This implies that, in FY79, even though officers were leaving, they were staying around longer before doing so.

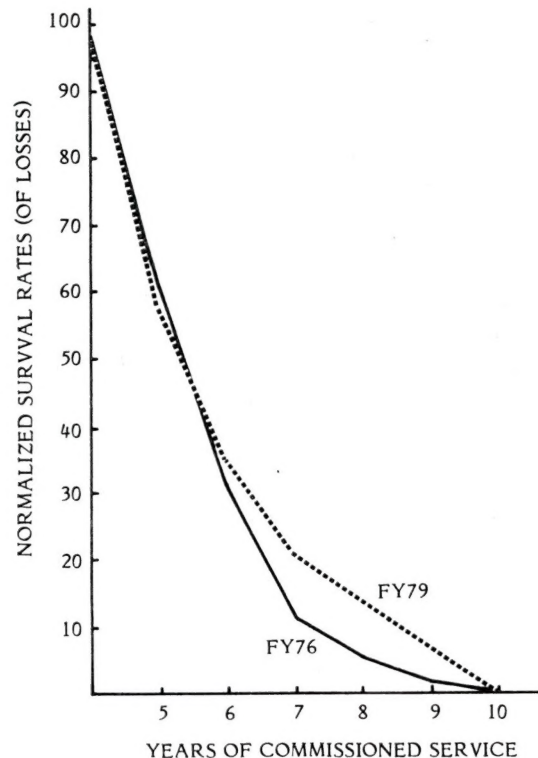


Figure 5. Distribution of resignations in the nuclear submarine career force base, FY76 and FY79.

2. Identifying trends in resignation behavior. The NSR computation is particularly helpful in identifying changes in the distribution of losses over the YCS 5-10 group. As an example, Figure 6 reveals that, during FY76, 77, and 78, even though 60 percent of the restricted line/staff corps (RL/staff) community resignations occurred by YCS 6, there was a recognizable change in the time when the remaining 40 percent departed. In FY76, the last 20 percent of officers to be lost were from YCS cells greater than 7, compared to YCS 7.5 and 8.0 for FY77 and FY78 respectively. The BFRs for RL/staff during those years declined slightly--from .9658 to .9637. Hence, while the propensity to resign increased somewhat, a greater portion of the losses were coming at a later point in the CFB period.

While useful, the NSR information is nevertheless cumbersome. It is desirable to reduce the information conveyed by the NSR into a more concise summary statistic. One measure is the mean length of service (YCS) of a community's resignations. This data is displayed for selected communities in Table 4. Note how it reveals the increasing tenure of population that left the RL/staff corps community from FY76-81, while the overall retention (BFR) of that community was remaining relatively constant.

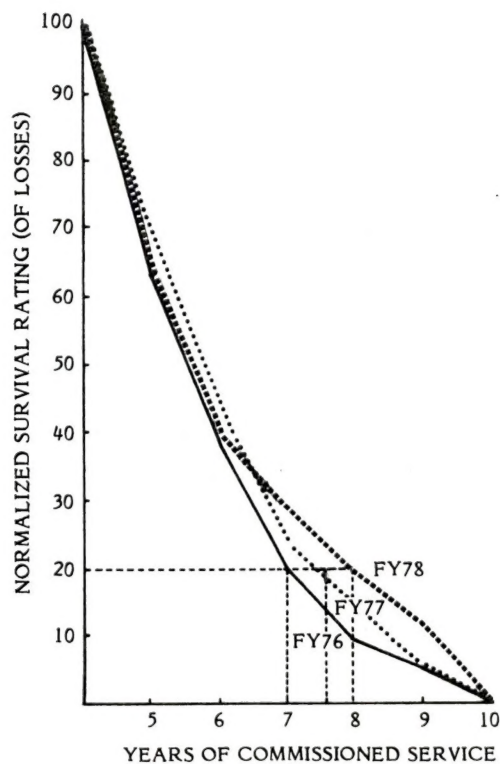


Figure 6. Distribution of resignations in the restricted line/staff corps career force base, FY76 and FY78.

Table 4

Mean Years of Commissioned Service (YCS) of Career Force Base Resignations, FY74-81, by Community

Community	Fiscal Year							
	74	75	76	77	78	79	80	81
Surface warfare	5.91 (.956)	5.82 (.956)	6.12 (.949)	5.92 (.922)	5.60 (.925)	6.23 (.943)	6.23 (.910)	6.03 (.926)
Submarine warfare (nuclear)	6.47 (.896)	6.61 (.851)	6.16 (.891)	6.41 (.922)	6.22 (.906)	6.23 (.897)	6.17 (.849)	6.49 (.901)
Pilots	6.07 (.908)	6.13 (.952)	6.24 (.948)	6.23 (.906)	6.64 (.862)	6.47 (.846)	6.51 (.882)	6.33 (.898)
Flight officers	5.62 (.974)	5.54 (.960)	6.00 (.955)	6.03 (.941)	6.09 (.945)	6.17 (.953)	6.88 (.948)	6.47 (.956)
Restricted line/ staff corps (excluding doctors/dentists)	6.34 (.970)	6.69 (.973)	6.41 (.976)	6.50 (.968)	6.66 (.964)	6.94 (.967)	6.98 (.961)	7.01 (.968)

Note. The base force resignation rates are in parentheses.

CONCLUSIONS AND RECOMMENDATION

The BFR provides a more accurate and timely measure of the maintainability of the Navy's officer force than does the currently used RR. In addition, it is just as simple a measure as the RR (if not more so). Therefore, it is recommended that the BFR be substituted for the RR as OP-01's official measure of officer retention.

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